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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/559,981	09/05/2006	John Kouvetakis	05-720-US2	6588

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EXAMINER

PATEL, REEMA

ART UNIT	PAPER NUMBER
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2812

MAIL DATE	DELIVERY MODE
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04/17/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/559,981	KOUVETAKIS ET AL.	
	Examiner	Art Unit	
	Reema Patel	2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 January 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5,6 and 10-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-3,5,6,10-12 and 17-30 is/are allowed.
- 6) ☒ Claim(s) 13-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>3/10/08</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This action is in response to an amendment filed 1/21/08.

Information Disclosure Statement

1. The information disclosure statement (IDS) was submitted on 3/10/08. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement has been considered by the examiner.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Soref et al. (U.S. 5,548,128; hereinafter 'Soref') in view of Yoshida (U.S. 2002/0136932 A1).

4. Regarding claims 13-15, Soref discloses a semiconductor comprising a Ge-Sn quantum structure formed over a silicon substrate (col 2, lines 45-47). Soref discloses the Ge-Sn quantum structure comprises $\text{Ge}_{1-x}\text{Sn}_x$ with an x value from about 0.02 to about 0.03 (col 2, lines 59-61) and the Ge-Sn quantum structure is formed over Ge-Sn epitaxial layer formed over the silicon substrate (col 3, lines 27-29).

5. Soref discloses the active layer comprises a quantum well structure (continuous) and hence not a quantum dot structure (discontinuous). However, Yoshida discloses a semiconductor device with an active layer comprising quantum dots ([0068]-[0077]).

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The motivation of using a quantum dot active layer is that it allows for greater efficiency as compared to that of a quantum well active layer ([0077]). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Soref with an active layer of quantum dots, as taught by Yoshida, so as to form a more efficient semiconductor device.

6. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Soref et al. (U.S. 5,548,128; hereinafter 'Soref') and Yoshida (U.S. 2002/0136932 A1) as applied to claim 13 above, and further in view of Yamaguchi et al. (2003/0219933 A1; hereinafter 'Yamaguchi').

7. Regarding claim 16, Soref and Yoshida discloses the limitations of claim 13 and the use of a silicon substrate but does not disclose that the substrate comprises Si(100). However, Yamauchi discloses that the use of an Si(100) substrate is desirable because an epitaxially grown film formed over such a substrate has a better crystallographic structure as compared to those films formed on other types of substrates ([0083]). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of Soref and Yoshida with the use of an Si(100) substrate so as to form an epitaxially grown film with better crystallographic structure.

Allowable Subject Matter

8. Claims 1-3, 5-6, 10-12, and 17-30 are allowed.

9. Claim 1 contains allowable subject matter because of the limitation of forming the $\text{Sn}_x\text{Ge}_{1-x}$ layer directly over a substrate consisting essentially of silicon. Claims 2-3, 5-6, 10-12, 25-28, and 30 depend on claim 1.

10. Claims 17 contain allowable subject matter because of the limitation of forming an epitaxial Ge-Sn layer using a SnD_4 precursor. Claims 18-23 and 29 depend on claim 17.

11. Claim 24 contains allowable subject matter because of the limitation of depositing a strained Ge layer on a GeSn buffer layer with the method of combining SnD_4 with a germanium precursor, Ge_2H_6 .

Response to Arguments

12. Applicant's arguments with respect to claims 13-16 have been considered but are moot in view of the new ground(s) of rejection.

Terminal Disclaimer

13. The terminal disclaimer filed on 1/21/08 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. 7,238,596 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Reema Patel whose telephone number is (571)270-1436. The examiner can normally be reached on M-F, 8:00-4:30 ET.

If attempts to reach the examiner by telephone are unsuccessful, please contact the examiner's acting supervisors, Walter Lindsay, Jr. (571)272-1674 or Scott Geyer (571)272-1958. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Reema Patel/
Examiner, Art Unit 2812

/Scott B. Geyer/

Acting SPE of Art Unit 2812